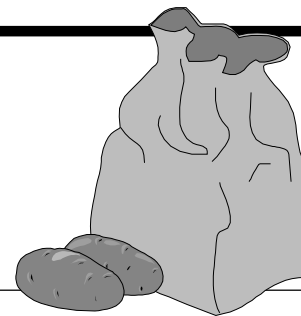


POTATO EYES



Vol. 12, Issue 5, September 2000 • Alexander D. Pavlista, Extension Potato Specialist

Regulating Genetic Modification

Genetic modification of crops (GM-varieties) through 'biotechnology' is jointly regulated by the USDA, EPA and FDA since the 1980s. The USDA through APHIS oversees field testing of GM-varieties. Under FIFRA, the EPA evaluates pesticide properties. And, the FDA assesses food and feed safety issues. Although traditionally-bred crop varieties do not undergo governmental regulation, GM-varieties must.

Regulatory Steps: From its concept, it takes as much as 10 years to commercialize a GM-variety. The development of the GM-variety can be questioned or even stopped by a Federal agency at 10 separate points in the process and there are six opportunities for the public to speak out. The 10 major steps toward release of GM-varieties are:

1. Biosafety Committee Review – Under the auspices of the NIH, an advisory group evaluates the potential risks of the concept. **(Public Review and Comment)**

2. Greenhouse Approval – USDA determines adequacy of research facility.

3. Field Authorization – USDA approves field trials; field inspections may be conducted. Attention is given to risks of out-crossing.

4. Transport of Seed – USDA oversees shipment of seed of GM-varieties.

5. Commercialization Permission – APHIS reviews all field trial studies. This review may take a year and requires from developers: environmental effects such as cross-breeding, wildlife effects such as on birds, beneficial insects and mammals, and weediness which deals with keeping the GM-variety controlled. If at any time APHIS decides that the GM-variety is a pest, development stops. **(Public is notified and comments solicited through the Federal Register.)**

6. Experimental Use Permit – If a GM-variety has anti-pest activity, then the EPA must issue approval for tests of 10 acres or more (an EUP). **(Public is notified and comments solicited through the Federal Registry.)**

7. Food Tolerance – Limits are established for pest-control proteins. The EPA examines: variety characteristics such as growth behavior, toxicology such as breakdown of protein in the digestive system, allergenicity dealing with normal dietary protein degradation, specificity to target organisms (pest), environmental fate such as breakdown of protein in soil, and pest resistance potential that will direct GM-variety management. **(Public is notified and comments solicited through the Federal Registry.)**

8. Registration – This step takes 18 months during which time the EPA reviews the environmental and toxicological data. If at any time the EPA questions the GM-variety's safety, development and sale is stopped. **(Public notified and comments are requested.)**

9. Safety Review – The FDA reviews the food and feed safety a GM-variety at least four months prior to its release. The review includes: assessment and testing to determine attributes such as allergenicity, consumption history of protein and identification of unsuspected effects, biological and agronomic characteristics relating modification to unmodified variety, and nutritional composition which compares levels of vitamins etc. between the modified and unmodified variety. The FDA determines that the GM-variety is not substantially different from the conventional variety and approves else it can stop development and sale. **(Public is notified and comments solicited through the Federal Registry.)**

10. Post-commercialization – All three agencies have the authority to halt sales if new data questions consumer safety or the environment.

New Potato Products Summary

The following is a review of new active ingredients recently released or going through registration. Under each is listed their Trade Name (possibly for other crops), Manufacturer, Active Ingredient, Chemical Family, Mode of Action, Target Use, and Registration Status. Products are listed Fungicides, Herbicides, Insecticides, and Plant Growth Regulators.

I. FUNGICIDES

Product Acrobat
Manufacturer American Cyanamid (now BASF)
Common Name Dimethomorph
Chemical Family Cinnamic Acid derivative
Mode of Action Cell wall formation inhibitor
Targets Late Blight
Status: Registered on POTATO. Mix with other products.

Product BAS 510 and BAS 516
Manufacturer BASF
Common Name unreleased
Chemical Family unreleased (strobilurin ?)
Mode of Action unreleased
Targets Early and Late Blights
Status: Registration pending on POTATO. It is a candidate as a 'reduced risk' product under FQPA.

Product Curzate
Manufacturer DuPont
Common Name Cymoxanil
Chemical Family Acetamide
Mode of Action Nucleic and amino acid synthesis inhibitor
Targets Late Blight (limited curative activity)
Status: Registered on POTATO. Mix with other products.

Product Cygnus / Sovran
Manufacturer BASF
Common Name Kresoxim-methyl
Chemical Family Strobilurin
Mode of Action Mitochondrial electron transport inhibitor
Targets Powdery Mildew, Blights (?)
Status: Registration is pending on POTATO.

Product Famoxate
Manufacturer DuPont
Common Name Famoxadone
Chemical Family Oxazolinedione
Mode of Action —
Targets Early Blight
Status: Registration is pending on POTATO. It is a candidate as a 'reduced risk' product under FQPA. Probably will be marketed in a mix with cymoxanil as the product Tanos.

Product Flint
Manufacturer Syngenta (Novartis)
Common Name Trifloxystrobin
Chemical Family Strobilurin
Mode of Action Mitochondrial electron transport inhibitor

New Potato Product Summary

Targets Early Blight
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

Product **Gavel**
Manufacturer Rohm and Haas
Common Name Zoxamide
Chemical Family Amide
Mode of Action Mitosis inhibitor (Cell Division inhibitor)

Targets Early Blight
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

Product **Guardian**
Manufacturer LG Chemicals
Common Name Ethaboxam
Chemical Family Thiazole Carboxamide
Mode of Action —
Targets Late Blight (preventive and curative activity)
Status: Has *potential* use on POTATO and legumes.

Product **Headline**
Manufacturer BASF
Common Name Pyraclostrobin
Chemical Family Strobilurin
Mode of Action Mitochondrial electron transport inhibitor
Targets Early and Late Blights
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

Product **Maxim**
Manufacturer Syngenta (Novartis)
Common Name Fludioxanil
Chemical Family Phenylpyrrole
Mode of Action —
Targets Fusarium dry rot, Rhizoctonia stem canker, Silver Scurf, others
Status: Registered on POTATO as seed treatment. It is a 'reduced risk' product under FQPA.

Product **Melody**
Manufacturer Bayer
Common Name Iprovalicarb
Chemical Family Amino Acid Amide Carbamate
Mode of Action —
Targets Late Blight
Status: Has a *potential* use on POTATO.

Product **Moncut**
Manufacturer Gowan & Nikon Nohyaku
Common Name Flutanol
Chemical Family Benzamide
Mode of Action —
Targets Rhizoctonia Stem Canker and Verticillium Wilt
Status: Registration is pending on POTATO.

Product **Omega**
Manufacturer Syngenta (Zeneca & ISK)
Common Name Fluazinam
Chemical Family Pyridinamine
Mode of Action —
Targets Early and Late Blights, Common Scab (?)
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

Product **Oxidate**
Manufacturer Bio Safe Systems
Common Name Hydrogen Peroxide
Chemical Family Peroxygen
Mode of Action Oxidant
Targets Storage Diseases
Status: Registered on POTATO.

Product **Purogene**
Manufacturer Bio-Cide Intern.
Common Name Chlorine Dioxide
Chemical Family Chlorine releaser
Mode of Action Oxidant
Targets Storage Diseases
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

Product **Quadris**
Manufacturer Azoxyastrobin
Common Name Syngenta (Zeneca)
Chemical Family Strobilurin
Mode of Action Mitochondrial electron transport inhibitor
Targets Early Blight and Late Blight (preventative and curative activities)
Status: Registered on POTATO. It is a 'reduced risk' product under FQPA.

Product **RPA 407213**
Manufacturer Aventis
Common Name Fenamidone
Chemical Family Imidazolinone
Mode of Action Electronic transport inhibitor
Targets Early Blight (preventative and curative activity)
Status: Registration is pending on POTATO. It is a candidate as a 'reduced risk' product under FQPA.

Product **Scala**
Manufacturer Aventis
Common Name Pyrimethanil
Chemical Family Anilinopyrimidine
Mode of Action —
Targets Early Blight
Status: Has a *potential* use on POTATO.

Product **Tattoo**
Manufacturer Aventis
Common Name Propamocarb Hypochloride
Chemical Family Carbamate
Mode of Action Fatty acid and phospholipid synthesis inhibitor

Targets Late Blight (Pythium Leak and Pink Rot ?)
Status: Registered on POTATO. Mix with other products.

Product **TM 210**
Manufacturer Tomen Agro
Common Name unreleased
Chemical Family unreleased
Mode of Action unreleased
Targets Late Blight (Pink Rot ?)
Status: Registration is pending on POTATO. It is a 'reduced risk' product under FQPA.

II. HERBICIDES

Product **Affinity / Aim**
Manufacturer FMC
Common Name Fenclazone
Chemical Family Aryl Triazolinone
Mode of Action PPO Inhibitor
Targets Broadleaves including cocklebur & water hemp
Status: Registered on field corn, soybean and wheat. It is pending on POTATO.

Product **Authority / Spartan**
Manufacturer FMC
Common Name Sulfentrazone
Chemical Family Aryl Triazolinone
Mode of Action —
Targets Broadleaves and Grasses
Status: Registered on soybean. Has *potential* use on POTATO.

Product **Axiom**
Manufacturer Bayer
Common Name Flufenact
Chemical Family Thiadizode
Mode of Action —
Targets Soil-applied for annual grasses and some broadleaves
Status: Registered on corn and soybean in a pre-mix. Has a *potential* use on POTATO.

Product **Balance**
Manufacturer Aventis
Common Name Isoxaflutole
Chemical Family Isoxazole
Mode of Action —
Targets Soil-applied for many annual grasses and some broadleaves.
Status: Registered on field corn in some States. Has a *potential* use on POTATO.

Product **Ecopant**
Manufacturer Nikon Nohyaku
Common Name Pyraflufen-ethyl
Chemical Family new
Mode of Action Prototox Inhibitor
Targets Total Vegetation Control, Desiccant

New Potato Product Summary

Status: Registration is pending for POTATO desiccation and on wheat. It's a candidate for 'reduced risk' under FQPA. It's active at very low rates, one gram ai/acre).

Product **Frontier X-2**
 Manufacturer BASF
 Common Name Dimethenamide-P
 Chemical Family Chloroacetamide
 Mode of Action —
 Targets Annual Grasses, Broadleaves, yellow nutsedge

Status: Not Registered.
 Registration is pending on POTATO, corn, sugar beet, and soybean. It is being considered for 'reduced risk' under FQPA.

Product **Inferno**
 Manufacturer Griffin
 Common Name Copper Ethylenediamine
 Chemical Family Organic Copper
 Mode of Action —
 Targets Desiccant, Aquatic Weeds
 Status: Recently registered for POTATO desiccation.

Product **Matrix**
 Manufacturer DuPont
 Common Name Rimsulfuron
 Chemical Family Sulfonylurea
 Mode of Action ALS inhibitor
 Targets Annual Grasses and Broadleaves, Triazine-resistant weeds. Methyl-Bromide alternative.
 Status: Registered on POTATO.

Product **Permit / Sempra**
 Manufacturer Monsanto / Gowan
 Common Name Halosulfuron
 Chemical Family Sulfonylurea
 Mode of Action ALS Inhibitor
 Targets Broadleaves including cocklebur and velvetleaf, and nutsedges. Methyl-Bromide alternative.
 Status: Registered on corn and sorghum. Has a *potential* use on POTATO and dry bean.

Product **Rely / Liberty**
 Manufacturer Aventis
 Common Name Glufosinate
 Chemical Family Butanoic Acid
 Mode of Action —
 Targets Total Vegetation Control, Desiccant
 Status: Recently registered on POTATO for desiccation. Also registered on field corn and soybean, and pending on sugar beet.

Product **Select / Prism**
 Manufacturer Valent
 Common Name Clethodim
 Chemical Family Cyclohexanone
 Mode of Action ACCase Inhibitor
 Targets Grasses (only)
 Status: Registered on several crops including sugar beet, dry bean, alfalfa and soybean. It is pending on TUBER vegetables.

III. INSECTICIDES

Product **Adage / Actara / Platinum**
 Manufacturer Syngenta (Novartis)
 Common Name Thiamthoxam
 Chemical Family Neonicotinoid
 Mode of Action Neurotoxin; Ingested Systemic: seed, soil and foliar treatments
 Targets Soil-dwelling, sucking and feeding insects: aphids, leafhopper and some beetles. Organo-phosphate alternative.
 Status: Registration pending on tuberous crops.

Product **Admire / Provado / Gaucho**
 Manufacturer Bayer
 Common Name Imidacloprid
 Chemical Family Chloronicotiny
 Mode of Action Neurotoxin; Ingested Systemic: seed, soil and foliar treatments
 Targets Sucking and feeding insects: aphids, beetles, psyllids, and grubs. Organo-phosphate alternative.
 Status: Registered for furrow and foliar applications to POTATO; registration pending as seed treatment.

Product **Ammo**
 Manufacturer FMC
 Common Name Cypermethrin
 Chemical Family Pyrethroid
 Mode of Action Neurotoxin, Sodium Flux; Contact or Ingested
 Targets Aphids, beetles et al.
 Status: Registered on POTATO.

Product **Aztec**
 Manufacturer Bayer
 Common Name Tebupirimphos + Cyfluthrin
 Chemical Family Organophosphate
 Mode of Action Neurotoxin, Acetylcholine inhibitor; Contact or Ingested; Soil application
 Targets Wide range including grubs and wireworm
 Status: Has a *potential* use on POTATO.

Product **Baythroid**
 Manufacturer Bayer
 Common Name Cyfluthrin
 Chemical Family Pyrethroid
 Mode of Action Neurotoxin, Sodium Flux; Contact or Ingested
 Targets CPB, ECB, leafhopper, fleabeetle
 Status: Registered on POTATO.

Product **Clinch**
 Manufacturer Syngenta (Novartis)
 Common Name Abamectin
 Chemical Family Avermectin
 Mode of Action Neurotoxin
 Targets Feeding insects as CPB
 Status: Registered on POTATO and other vegetables.

Product **Decis**
 Manufacturer Aventis
 Common Name Deltamethrin
 Chemical Family Pyrethroid
 Mode of Action Neurotoxin, Sodium Flux; Contact or Ingested
 Targets Beetles and bugs
 Status: Registration is pending on tuber vegetables.

Product **Fulfill**
 Manufacturer Syngenta (Novartis)
 Common Name Pymetrozine
 Chemical Family Pyridine azomethene
 Mode of Action Stops feeding - death by starvation; Ingested
 Targets Sucking insects: aphids. Organo-phosphate alternative.
 Status: Registered on POTATO and other tuber vegetables. It has no effect on beneficial insects. It is a 'reduced risk' product under FQPA.

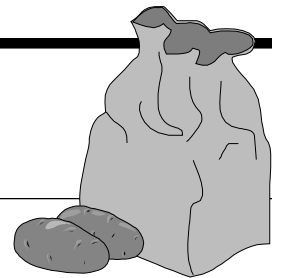
Product **Regent**
 Manufacturer Aventis
 Common Name Fipronil
 Chemical Family Phenylpyrazole
 Mode of Action Neurotoxin (unique mode); Systemic with long residual
 Targets Many families
 Status: Registered on corn. Registration is pending on POTATO.

Product **Spintor**
 Manufacturer Dow AgroScience
 Common Name Spinosad
 Chemical Family Macrocylic lactone
 Mode of Action Neurotoxin
 Targets Several families. Organo-phosphate alternative.
 Status: Registered on POTATO. It is a 'reduced risk' product under FQPA. It has a low environmental impact and is safe to many beneficial insects.



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NEBRASKA POTATO EYES



IV. PLANT GROWTH REGULATORS

Product Apogee
Manufacturer BASF / Kumini
Common Name Prohexadione Calcium
Chemical Family Carboxylate
Mode of Action —
Targets Reduce growth balancing canopy and fruit production
Status: Registered on some vegetables. Has *potential* in seed potato production. It is a 'reduced risk' product under FQPA.

Product AuxiGro
Manufacturer Auxein
Common Name Glutamic Acid and derivatives
Chemical Family Butanoic Acid
Mode of Action unknown, "metabolic primer"
Targets Growth and Yield
Status: Recently registered on POTATO.

Product DROPP / FreeFall
Manufacturer Aventis / Griffin
Common Name Thidiazuron
Chemical Family Phenylurea
Mode of Action Cytokinin
Targets Cell Division promoter, Anti-senescence
Status: May Have *potential* use on POTATO.

Product Ecolyst
Manufacturer Valent
Common Name MBTA
Chemical Family Substituted Tertiary Amine
Mode of Action —
Targets Increased sugar accumulation
Status: Novel PGR registered on citrus. Has *potential* use for processing POTATO and sugar beet. It is a 'reduced risk' product under FQPA.

Product PIX
Manufacturer BASF
Common Name Mepiquat Chloride
Chemical Family Quaternary Ammonia
Mode of Action Gibberellin Inhibitor
Targets Shorten Internode Growth, Dwarfing
Status: Registered on cotton. May have *potential* use in Fr. fry and baking POTATO.

Check out the Nebraska Potato Eyes on the WWW at: <http://www.panhandle.unl.edu/peyes.htm>



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